University of Texas at El Paso
EE 3338 – Electronics I
Summer 2023

Course Information

Meeting day and time: M-F, 2:00 pm – 4:10 pm
Room: Classroom Building C204
Final Exam: Wednesday, August 9, 4:00 pm – 6:45 pm
Course designation: EE 3338-002
CRN: 36250

What is this course about? EE 3338 is the course that introduces you to electronic devices and the methods to analyze electronic circuits. This course focuses on the three major electronic devices: the diode, MOSFET, and BJT. We will see a variety of tools to analyze these circuits such as small-signal and large-signal analysis. Finally, we will see some basic applications of these devices such as amplifiers, logic gates, and AC-to-DC converters.

What can I expect? It is assumed that students in this class have some practice with circuit theory and pre-calculus. The students are expected to take an active role by completing readings and home assignments before class, coming to class ready to participate with peers and with the professor, and reviewing routinely for assignments and exams. In this course, we have evidence that every student can achieve if they are motivated to be an active learner!

Instructor Information

Jesus J. Gutierrez, Ph.D.
Assistant Professor of Instruction
Office: ENGR A-338
Office Hours: M-R 11:30 am – 1:00 pm
E-mail: jjugutierrez4@utep.edu

Course Materials

- Textbook (Main):
  Microelectronic Circuits, 7th or 8th Edition
  A. S. Sedra, K. C. Smith, T. C. Carusone, and V. Gaudet
  Oxford University Press, 2020, 1296 pages
  Companion Website: www.oup.com/he/sedra-smith8e

- Textbook (Optional):
  The Art of Electronics, 3rd Edition
  Paul Horowitz and Winfield Hill
  Cambridge University Press, 2015, 1120 pages

Do not feel intimidated if you’ve never been to a professor’s office hours. We are here to help you! You can come alone or with a friend. You can talk about the course, advice for future courses to take, and how things are going outside school. I have an open-door policy, so if I’m in my office, you can come in at any time!
EE 3338 – Electronics I
Course Syllabus

- **What should you bring to class everyday:**
  - Pen/pencil and paper/notebook for taking notes.
  - TI-85 scientific calculator or equivalent (no TI-Nspire allowed in exams)
  - Laptop with access to the internet.
  - Access to LTSpice

Course content will be delivered through Blackboard. Also, important class announcements will be delivered via Blackboard and/or e-mail. Please make sure your UTEP e-mail is working, and you have stable access to the internet.

LTSpice is a free, open-source SPICE simulator software developed by Analog Devices, Inc. that includes a graphical schematic capture interface. To download and install LTSpice, visit: [https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html](https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html)

If a student has no computer with access to the internet, from UTEP’s Technology Support Center has borrowing services for laptops and tablets: [https://www.utep.edu/technologysupport/TSCenter/TSC_EQ_LaptopsTablets.html](https://www.utep.edu/technologysupport/TSCenter/TSC_EQ_LaptopsTablets.html)

UTEP’s Technology Support center also helps for technological needs beyond your scope of troubleshooting, so make sure you contact them if you encounter technical difficulties.

**Corequisites**

EE 3138 – Lab for EE 3338

**Prerequisites**

By Course (with grade of “C” or better):
EE 2351 – Circuits II

**Course Outline**

Topics covered in this course include:

3. MOSFETs: Current and Voltage Characteristics, Modes of Operation, Applications.
4. BJTs: Current and Voltage Characteristics, Modes of Operation, Applications.
6. Introduction to Logic Circuits, Logic CMOS gates, memory and clocking circuits.

**Relationship to (ABET) Program Outcomes**

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics:
  
  *Students use mathematical and engineering concepts in the analysis and design of electronics.*
How can I succeed in the course?
This course may be difficult to you, especially if you received A’s and B’s in previous courses for memorizing material. But this course is not about memorizing equations or theory. It's about applying equations and deriving them. You may be wondering; how do I achieve this? The answer in my experience is… practice, practice, practice! If you practice enough, you will be able to recognize patterns and become familiarized with the process needed to derive equations, which will give you a deeper understanding about systems and their usefulness and presence in our everyday lives.

Rules and Policies

How is your grade determined?
Student achievement will be assessed using a combination of in-class work, homework, quizzes, and exams. All student grades are protected by the Privacy Act of 1974.

Your course grade will be determined by your weighted performance in the following categories:

1. In-Class Assignments ………….20%  
   90% – 100% → A
2. Weekly Exams (3)………………..54%  
   80% – 89% → B
3. Final Exam …………………….18%  
   70% – 79% → C
4. Class Participation………………….8%  
   60% – 69% → D
   0% – 59% → F

Not all students do as well as they think they will when they walk into class on the first day. Why is this? My experience tells me that:
1) Some students do not have the active learning and studying skills that they should already have at college level (it takes one or two exams to recognize this). We can fix this together.
2) Some students do not put the effort that is necessary (even though they think they are). You can fix this if you are honest with yourself.

For some students, there may be a “gray area” between two letter grades, so two people getting the same weighted average grade could get different letter grades. If you are in one of these gray areas, whether you get a higher grade depends on two factors: (a) class participation and (b) whether your performance has been improving or declining over time.

What are In-Class Assignments?
On each class, with some exceptions, there will be an assignment covering the material for the day. The assignments will account for 20% of the final grade. The time allotted for the assignment will be around 15 minutes. The assignments may be done individually or in groups. The two lowest graded in-class assignments will be dropped.
How can you participate in class if you're shy?
Although I do my best to ensure a safe space for learning for everyone to participate, there may be some students that are quiet learners. If you are a quiet learner, you can participate with honest and serious participation through student response systems, collaborating your small group during assignments, engage with me (the professor) during office hours or by e-mail, or even helping fellow students by explaining concepts inside and outside of class. There are many other ways you can participate even if you don’t want to participate in front of the whole class.

What are the Rules for the Exams?

- You will only have a calculator, pen or pencil, eraser, and one cheat sheet with formulas or problems with your name and UTEP ID on both sides of the paper.
- Full work must be shown for full credit. Work must be neat and well organized. The final answer must be boxed and given proper units.
- The tentative schedule for the exams is shown in the chart below, subject to change:

<table>
<thead>
<tr>
<th>Date</th>
<th>Exam #</th>
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<tbody>
<tr>
<td>Monday, July 17th</td>
<td>Exam #1</td>
</tr>
<tr>
<td>Monday, July 24th</td>
<td>Exam #2</td>
</tr>
<tr>
<td>Monday, July 31st</td>
<td>Exam #3</td>
</tr>
<tr>
<td>Wednesday, August 9, 4:00 pm – 6:45 pm</td>
<td>Exam #4</td>
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~ Missed Exams ~

A missed exam can be made-up **IF AND ONLY IF**:
(1) the reason for missing the exam is beyond the student’s control: medical excuse, jury duty, death in the family or automobile accident, and

(2) **prior consent** is obtained from the professor for missing the exam based on a non-frivolous reason, e.g., such as a job interview, conference, or out-of-town job-related travel.

In either case, the student must submit a written and signed statement the day before the exam, describing the reasons for missing, appropriate documentation, and petition for a make-up exam. A missed exam will carry zero grade if conditions are not met.

How do I Participate in the Course?
As an active learner, you will appreciate the value of discussions and participation in class assignments. Participating in class does not necessarily mean talking a lot or asking a lot of questions. Some of the most helpful things you can do to enrich participation is doing class work, helping fellow classmates by explaining during group exercises, and answer questions asked by the professor in a thoughtful manner.

What will I achieve after taking this course? - Course Goals
- This course should prepare you to succeed in future Electrical Engineering courses. You will learn how to be an active learner in the lecture hall and how to actively study. Research has shown that students who do readings/assignments before class, actively participate in class, and review notes regularly can and will succeed in this and future
courses. This course is designed to equalize your readiness for class, and your effort will pay off as you practice connecting the topics together and gaining confidence in your ability!

- **This course will help you in learning how to learn.** How do you know you are learning? When you make mistakes, you identify what you don’t know. Making mistakes is the key to learning. Recognizing knowledge gaps and asking questions is key to learning. It is best to make mistakes in homework and assignments when the stakes are low, so you are successful on higher stakes assignments.

- **This course will provide you with the introductory concepts and skills that make up the field of Electronics.** At the end of the semester, you will:
  - **Understand** the principles of non-linear devices like diodes, MOSFETs, and BJTs.
  - **Apply** different methods for analyzing non-linear circuits.
  - **Design** electronic circuits that conform to specified constraints.
  - **Understand** the different applications and roles that electronic devices have in analog and digital systems by **analyzing** circuits.

- **This course should excite you about circuits and electrical engineering in general.** Throughout the semester I hope you ask yourself and me, why is this relevant to me? Some lessons will be more obvious as they relate to everyday devices and applications. I hope that the content we learn in this semester will cause you to ask more questions, and even leave you with more questions than answers! If I get you to read some circuits and electrical engineering material other than the book on your own, share it with me! I will be a happy professor.

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**How successful students have done well in this course?** They always read the textbook and pay attention to what they are reading and reflect on what they are unsure about. They complete their homework on time with plenty of time to make mistakes and ask questions. They value taking notes and doing assignments as valuable tools to learn. They attend each class and come prepared. They are **brave and vulnerable,** meaning that they are willing to make mistakes, take the chance of drawing a circuit or a solution wrong, and attempt to answer the question by themselves before checking in with a peer. They review on their own every question to see if they could teach it to someone else. **Successful students don’t just get the right answer and move on, they are able to explain how they arrive at that answer.**

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**Course Calendar**

This is a tentative schedule of the course topics, and assignments, subject to change.

<table>
<thead>
<tr>
<th>Day</th>
<th>Dates</th>
<th>Topics</th>
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<tbody>
<tr>
<td>1</td>
<td>Tuesday, July 11</td>
<td>0. Important Circuit Concepts</td>
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<tr>
<td>2</td>
<td>Wednesday, July 12</td>
<td>1a. Introduction to Electronics, 1b. Introduction to Electronic Signals</td>
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<tr>
<td>3</td>
<td>Thursday, July 13</td>
<td>1c. Amplifier Circuit Models</td>
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<tr>
<td>Day</td>
<td>Date</td>
<td>Topic</td>
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<td>4</td>
<td>Friday, July 14</td>
<td>1d. Non-Ideal Properties of Op-Amps, 2a. Introduction to Nonlinear Devices</td>
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<tr>
<td>5</td>
<td>Monday, July 17</td>
<td>Exam #1, 2a. Introduction to Nonlinear Devices</td>
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<tr>
<td>6</td>
<td>Tuesday, July 18</td>
<td>2b. Introduction to the Diode</td>
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<tr>
<td>7</td>
<td>Wednesday, July 19</td>
<td>2c. Diode Circuits,</td>
</tr>
<tr>
<td>8</td>
<td>Thursday, July 20</td>
<td>3a. Introduction to MOSFETs 3b. MOSFET Current-Voltage Characteristics</td>
</tr>
<tr>
<td>9</td>
<td>Friday, July 21</td>
<td>3c. MOSFET Circuits Under DC Conditions</td>
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<tr>
<td>10</td>
<td>Monday, July 24</td>
<td>Exam #2, 3d. PMOS and CMOS Circuits</td>
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<tr>
<td>11</td>
<td>Tuesday, July 25</td>
<td>4a. Introduction to the BJT, 4b. BJT Current-Voltage Characteristics</td>
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<tr>
<td>12</td>
<td>Wednesday, July 26</td>
<td>4c. BJT Circuits Under DC Conditions</td>
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<tr>
<td>13</td>
<td>Thursday, July 27</td>
<td>5a. Basic Principles of Transistor Amplifiers</td>
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<tr>
<td>14</td>
<td>Friday, July 28</td>
<td>5b. Common-Gate and Common-Emitter Amplifiers</td>
</tr>
<tr>
<td>15</td>
<td>Monday, July 31</td>
<td>Exam #3, 5c. Biasing Transistor Amplifiers</td>
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<tr>
<td>16</td>
<td>Tuesday, August 1</td>
<td>5c. Biasing Transistor Amplifiers</td>
</tr>
<tr>
<td>17</td>
<td>Wednesday, August 2</td>
<td>5c. Biasing Transistor Amplifiers</td>
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<tr>
<td>17</td>
<td>Thursday, August 3</td>
<td>6a. Introduction to Logic Circuits</td>
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<tr>
<td>18</td>
<td>Friday, August 4</td>
<td>6c. Design of CMOS Gates</td>
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<td>19</td>
<td>Monday, August 7</td>
<td>6d. Memory and Clocking Circuits</td>
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<tr>
<td>20</td>
<td>Wednesday, August 9</td>
<td>Exam #4</td>
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**Academic Dishonesty**

As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student’s work is a fair representation of the student’s ability to perform is the basis for departmental and institutional quality. All students within the Department are expected to observe appropriate standards of conduct.

Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the

**Did you know?** Bloom’s Taxonomy of Learning helps you categorize learning tasks based on their complexity. You should be able to do the lower tasks before moving on to more complex ones near the top. What kind of questions do you have trouble with on homework or exam? Practice what you have trouble with.
submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Any case involving academic dishonesty will be referred to the Office of the Dean of Students. The Dean will assign a Student Judicial Affairs Coordinator who will investigate the charge and alert the student as to its disposition. Consequences of academic dishonesty may be as severe as dismissal from the University. See the Office of the Dean of Students’ homepage (Office of Student Life) at http://studentaffairs.utep.edu/dos for more information.

You can also refer to the IEEE website for information on our code of ethics: http://www.ieee.org/about/corporate/governance/p7-8.html

**American Disabilities Act**

The University is committed to providing services, equipment, and accommodations to individuals with documented disabilities to provide them with equal opportunities to participate in programs, services, and activities in compliance with Sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990, and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

**Discrimination Statement**

I do not discriminate, nor will I allow discrimination, on the basis of race, color, national origin, sex, religion, age, disability, genetic information, veteran’s status, sexual orientation, or gender identity. Members of the UTEP community are protected from discrimination and harassment by the State and Federal Laws.

**University Resources**

**Technology Resources**

- **UTEP Technology Support**: Students experiencing technological issues or challenges (e-mail, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. www.utep.edu/technologysupport
- **UTEP Engineering Technology Center (ETC)**: Provides laptop and computer repair services for engineering students, as well as service requests for software. www.utep.edu/engineering/etc/
Academic Resources

- **UTEP Library**: Access to a wide range of resources including online, full-text access to thousands of journals and e-Books, plus reference services and librarian assistance for enrolled students. [www.utep.edu/library/](http://www.utep.edu/library/)

- **Math Resource Center for Students (MaRCS)**: Ask a tutor for help (including remotely) and explore available math resources like formula sheets, tables, and videos. [www.utep.edu/science/math/marcs](http://www.utep.edu/science/math/marcs)

- **Advancement Center for Engineering Students (ACES)**: Students serving other students. Hybrid tutors provide tutoring for a wide range of topics including engineering, math and science, and also manages room reservations. [www.utep.edu/engineering/student-resources/student-resources-aces.html](http://www.utep.edu/engineering/student-resources/student-resources-aces.html)

Individual/Well-Being Services

- **YWCA Early Learning Academy**: Conveniently located on campus to serve the, YWCA’s Early Learning Academy is the best childcare solution for UTEP students, faculty, and staff. [https://www.utep.edu/student-affairs/early-learning-academy/](https://www.utep.edu/student-affairs/early-learning-academy/)

- **Military Student Success Center**: Assists personnel in any branch of service to reach their educational goals. [www.utep.edu/student-affairs/mssc/](http://www.utep.edu/student-affairs/mssc/)

- **Center for Accommodations and Support Services (CASS)**: Assists students with ADA-related accommodations, for coursework, housing, and internships. [www.utep.edu/student-affairs/cass](http://www.utep.edu/student-affairs/cass)

- **Counseling and Psychological Services**: Provides a variety of counseling services including individual, couples, and group sessions, as well as career and disability assessments. [www.utep.edu/student-affairs/counsel](http://www.utep.edu/student-affairs/counsel)